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## Corn Diseases: Reviewing the 2007 Growing Season

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## Corn diseases: Reviewing the 2007 growing season

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Several diseases were prevalent in corn during the 2007 growing season. Weather conditions varied greatly across the state and as a result disease problems did too. An increase in corn following corn acres (10.3%) impacted the incidence of several diseases.

### Anthracnose

Anthracnose is caused by the fungus *Colletotrichum graminicola*. There are three distinct phases of anthracnose disease: leaf blight which usually occurs early in the season, and top die back, and stalk rot, which usually occur from growth stage R3. This past growing season, anthracnose leaf blight was prevalent on the lowest leaves of plants in corn-following-corn fields early on, however as the weather became drier in July, the leaf blight did not progress up the plants.

Overwintered corn surface residue is an important source of inoculum for anthracnose leaf blight, thus the disease is always more severe in corn-following-corn fields. Infection of seedling leaves occurs from spores that are produced in fungal fruiting structures (acervuli) and dispersed by splashing and blowing raindrops. Although anthracnose leaf blight can cause significant damage to very young plants and contribute to postemergence stand loss, oftentimes the corn seedlings are growing so quickly, they appear to outgrow the disease. Such was the case this year when growing degree days accumulated more rapidly. It has been hypothesized that the lesions that develop on the lower leaves of the plant may provide a source of inoculum (spores) for subsequent infections of leaves higher up on the plant and also the stalk. Stalk wounds allow *C. graminicola* to infect and colonize the vascular system of the corn plant. Under favorable conditions, vascular infections can result in anthracnose top die back (high temperatures and frequent rains) or stalk rot (high temperatures and plant stress following pollination).

Anthracnose disease is favored by warm temperatures (70-85 °F), high relative humidity, and periodic rainfall. Extended periods of high humidity are required for sporulation by the fungus. The spores are dispersed to host tissues in splashing raindrops.

In association with Dr. Paul Esker at University of Wisconsin, we collected data on the incidence and severity of anthracnose, using a Long Term Corn-Soybean Rotation in Iowa. Our preliminary results suggest that anthracnose severity is significantly ( $P < 0.05$ ) affected by cropping system (increasing with an increase in the number of years of corn-on-corn). In addition, we found no correlation between the incidence and severity of anthracnose leaf blight phase with stalk rot.

Most hybrids today are at least moderately resistant to anthracnose stalk rot; however, if exposed to abundant inoculum under favorable environmental conditions, they develop anthracnose stalk rot, although disease development is slower and yield losses slight. Resistant hybrids are commercially available; however, resistance to the leaf blight phase is not highly correlated to resistance to the stalk rot phase. Tillage reduces the risk of disease by incorporating infected crop debris into the soil where the fungus is less able to survive since it is a poor competitor. To date, there are no fungicides recommended for management of the anthracnose pathogen.

## Eyespot

Eyespot (*Kabatiella zeae*) was prevalent throughout Iowa earlier on this growing season, and severity was greatest in the northeast part of the state due to the cooler wetter conditions. Warmer, drier weather in mid-season slowed disease development and probably lessened the impact of the disease on yield. Symptoms of eyespot are small round spots about 1/8 inch in diameter with a brown border and a yellow halo.

The eyespot fungus survives in corn residue. Under cool, moist conditions, spores are produced and splashed or blown by wind onto corn plants. Leaf wetness is required for germination and infection. The incubation period from infection until symptoms appear is about 9-10 days. Eyespot lesions can occur on seedlings early in the spring; and then spread to higher leaves in the late spring and early summer, if conditions are favorable. Infection of the upper leaves can destroy photosynthetic leaf area and predispose plants to stalk rot.

Hybrids vary in their susceptibility to eyespot. Check with your seed dealer. Rotation and tillage reduce inoculum levels and therefore the risk of disease. Fungicide applications early in the epidemic can significantly reduce disease and protect yield.

## Gray leaf spot

Gray leaf spot (*Cercospora maydis*) was more severe in southeast Iowa than it has been in previous years. Very high humidity in August favored development of the disease. Tan to gray long (1-2") rectangular lesions are characteristic of gray leaf spot (GLS).

The gray leaf spot fungus overwinters on corn debris and thus disease risk is higher in corn-following corn fields. Warm temperatures and high humidity favor sporulation (production of spores) on residues. Spores are blown by wind onto the lower leaves of the present season's corn plants. Infection requires leaf surfaces to be wet for 11 to 13 hours and relative humidity in the leaf canopy to be at or above 90% for an uninterrupted period of 12 to 13 hours. In our field trials at Crawfordville and Fort Madison, we first saw GLS lesions on the lower leaves in mid-July. In central Iowa, GLS was first observed in late July. These first lesions provide inoculum for secondary spread of the disease to the upper leaves of the plant. As the growing season progresses, GLS severity increases depending on the susceptibility of the hybrid and the environmental conditions.

Management of GLS requires an integrated approach. Many hybrids have good tolerance to the disease, and hybrid selection should be considered as the first line of defense. On more susceptible hybrids, well-timed fungicide applications may be profitable. Other management practices include rotation, and tillage which decrease the amount of inoculum.

## Common and Southern rust

Two types of rust occur on corn. Common rust (*Puccinia sorghi*) is widespread each year in Iowa. We usually see common rust occurring on corn in early July. Southern rust (*Puccinia polysora*) occurs less frequently in Iowa. In late August, severe leaf blighting due to southern rust occurred throughout central and southern Iowa. The last severe outbreak of southern rust in Iowa was in 1999. This disease had been reported in Nebraska and Kansas earlier in the growing season.



Temperatures and precipitation in Iowa throughout August were well above normal and thus highly favorable for southern rust development.

The spores of *P. sorghi* and *P. polysora* are windblown to Iowa from the South each season. A minimum of six hours of leaf wetness and relative humidity >95% is required for spore germination and infection. Common rust development is favored by cool (60 to 77°F), humid conditions. Development of the pathogen slows down or stops when the weather becomes hot and dry. Conversely, high temperatures (80-90°F) and humidity favor the development of the Southern rust. Under these conditions, new infections can occur every seven days, resulting in numerous new rust lesions and extensive leaf blighting. Southern rust can develop rapidly, resulting in severe and early senescence and considerable yield loss (up to 45%).

Southern rust can be distinguished from common rust in two ways:

- Color: Common rust spore pustules are brick red; southern rust spore pustules are bright orange (Photos 1 and 2).
- Development of lesions/pustules: Common rust pustules develop on both upper and lower leaf surfaces; southern rust pustules develop predominantly on the upper leaf surfaces (Photo 3).

All of the numerous fungicides labeled for use on corn effectively control rust diseases but a timely application is vital. On hybrid corn, fungicide applications for rust management are rarely economical but they are justified on seed corn production fields since inbreds are considerably more susceptible to the disease

### **Aspergillus ear rot**

Aspergillus ear rot was a problem in corn fields in northwest Iowa this growing season. The concern with this disease is the production of aflatoxins, which are extremely toxic chemicals produced by two molds *Aspergillus parasiticus* and *A. flavus*. Aflatoxin accumulation is usually associated with poor storage conditions. However, hot, dry conditions during grain fill increase the risk of Aspergillus infection and aflatoxin contamination in the field.

Aspergillus fungi survive in plant residues. Numerous spores are produced in hot, humid conditions and carried by wind throughout the field. Infection occurs through corn silks, when they are yellow-brown and still moist, or in association with insect or bird damage to the developing kernels. High temperatures (80-100° F) and high relative humidity (85%) favor the growth of Aspergillus in the field. Ear rot symptoms on corn ears can be recognized as gray-green or yellow-green powdery mold growth on and between the corn kernels.

Although the presence of Aspergillus mold does not necessarily indicate aflatoxin contamination, there is certainly an increased risk. Aflatoxins are produced under certain conditions, which include temperatures from 55-104° F (optimum 81--86° F), and 17-18 percent and higher moisture content. High nighttime temperatures (<70° F) in July and August favor the production of aflatoxin in the field. In addition, aflatoxin contamination does not occur uniformly from kernel to kernel.

The U.S. Food and Drug Administration regulates aflatoxin levels in food and livestock feed. An “action level” of 20 parts per billion (ppb) for aflatoxins in corn has been established for

interstate commerce. Since this appears to be a high risk year in southeast and south central Iowa for aflatoxin contamination, it is likely that aflatoxin screening will be done at local elevators.

There is little that can be done in season to reduce the risk of *Aspergillus* preharvest aflatoxin contamination. However, postharvest aflatoxin contamination can be reduced. Corn in high risk areas should be scouted at, or just prior to, black layer (physiological maturity), and again two weeks prior to harvest. If greater than 10 to 15 percent of the ears show extensive mold growth, a sample should be collected for aflatoxin analysis.

Contaminated fields should be harvested as soon as possible after the field matures. Adjust the combine to reduce kernel damage and reduce the amount of lightweight infested grain being harvested. Ensure storage bins are clean of debris from the previous season. Shelled corn should be dried to 13 percent moisture or less as soon as possible after harvest, and cooled to 35-40 °F for the duration of winter to reduce fungal growth and aflatoxin production.

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